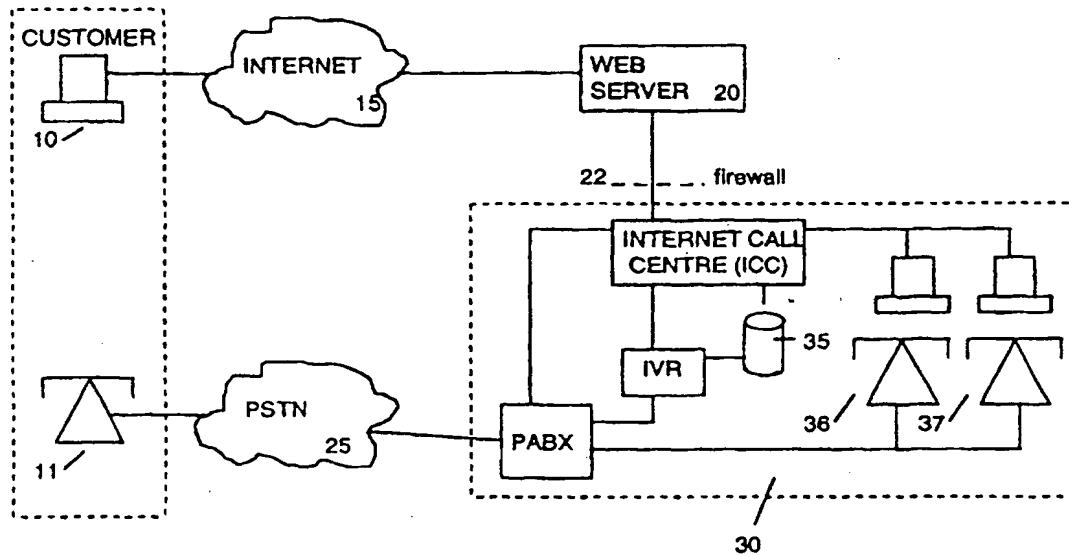


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(54) Title: TELECOMMUNICATIONS CALL CENTRE



(57) Abstract

A telecommunications system comprises a server (20) arranged to issue information to a customer (10) and to receive data from the customer over a data network (15) and a processing means, coupled to the server (20), which is arranged to extract, from the received data, a telephone number of the customer. For improved security and efficiency, the system further comprises initiation means to initiate a telephone call to that customer via a telephone network (25) independently of the data network and an automated response system which is arranged to communicate with the customer by means of the telephone call (11).

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TELECOMMUNICATIONS CALL CENTRE

TECHNICAL FIELD

This invention relates to a service for users of a data network, and to a system for providing the service. More particularly it relates to a service for users of the Internet.

5

BACKGROUND OF THE INVENTION

An increasing use is being made of the Internet for shopping. Customers equipped with a computer terminal and a link to the Internet can browse World Wide Web (WWW) information pages stored on the 10 servers of various companies. A vast amount of information can be supplied by the companies, in the form of text, graphics, audio and video clips. An interested customer can often order a product, or demand more information about a particular product which he sees by completing a form which appears on his terminal's display.

15

There is a problem with this method of ordering products because there are concerns about the security of information which is passed over the Internet. A customer typically enters their name, address and credit card details. This information could be intercepted at some point 20 between the customer and the company's server.

25

One known attempt to overcome this problem is to link a company's Web Server to a telephone call centre which is manned by staff or 'agents'. A customer who is interested in ordering a product, or obtaining more information completes an on-screen form, as before, but omits much of the sensitive information. Instead, the customer enters their telephone number. This information is received at the company's Web Server, and passed to an agent who then calls the customer over the conventional switched telephone network.

This system requires a significant number of staff to man the call centre, many of whom will be dealing with routine tasks such as transcribing credit card information supplied by customers. It has proved difficult to 5 match the peaks and troughs in demand for promptly answering such calls throughout the day with an appropriate number of staff. Rapid expansion of a successful call centre operation is constrained by the need to acquire and train new operators, particularly where they need to be trained to interact with a variety of databases during the course of a 10 call.

The present invention addresses such problems.

SUMMARY OF THE INVENTION

15 According to one aspect of the present invention there is provided a telecommunications system comprising:

- a server arranged to issue information to a customer and to receive data from the customer over a data network;
- a processing means, coupled to the server, which is arranged to extract, from the received data, a telephone number of the customer;
- initiation means to initiate a telephone call to that customer via a telephone network independently of the data network; and
- an automated response system which is arranged to communicate with the customer by means of the telephone call.

25

The use of an automated response system has the advantages of being relatively easy and cheap to scale as demand for the service grows. It also has the advantage of being portable. Preferably the automated response system is an Interactive Voice Response (IVR) system.

30

The use of a telephone call over the switched telephone network provides a more secure medium over which to gather information from, or deliver information to, the customer. This is particularly useful where a customer wishes to submit or receive personal information such as financial or medical information.

35

5 The customer may specify the telephone number at which they wish to be called-back or the data received from the customer may include an identifier of the customer and the processing means can be arranged to retrieve a stored telephone number of the customer using the customer identifier.

10 The automated response system may receive further data from the customer by means of the telephone call, such as credit card details, and store this information. Alternatively, or additionally, the automated response system may be arranged to deliver further data to the customer by means of the telephone call. The processing means may be arranged to extract, from the received data, an information request, to retrieve the requested information and to deliver it to the customer by means of the telephone call. The information may be retrieved from 15 databases of customer information, such as financial or medical information. This has the advantage of minimising the length of the call-back session, thereby minimising the cost of telephone calls and minimising the length of time that a customer needs to spend on the call-back session.

20 The automated response system can adapt to the particular information that has been requested, such as by playing prompts that are appropriate to the requested information.

25 Advantageously the server can be arranged to issue a plurality of information pages to a customer and the automated response system can be arranged to retrieve information dependent upon the page to which a customer responds and to deliver the retrieved information to the customer by means of the telephone call. Pages can be provided for 30 typical customer requests such as "account balance", "list recent transactions". This has an advantage of allowing a customer to enter a minimum amount of information, thereby reducing the chance of errors.

35 The automated response system can deliver the requested information by voice, facsimile or data transfer. Advantageously the initiation means which initiates a telephone call to the customer monitors a response to

the call and communicates with the customer in a manner which is compatible with the monitored response. For example, information can be delivered by fax when a fax machine response is detected.

- 5 The system may further comprise means for determining, from stored customer information and from the data received from the customer, whether to permit the initiation means to initiate a call to the customer.

Advantageously the system can further comprise means for determining, 10 from stored customer information and from responses made by the customer during the telephone call, whether to continue the telephone call to the customer. One way of achieving this is by performing speech recognition. This can be combined with a mechanism for comparing the customer's speech pattern with a stored record of the customer's speech 15 pattern. This has an advantage of adding a further level of security, ensuring that the called party involved in the telephone call is an authorised person.

Preferably the automated response system is coupled to a call centre 20 manned by human operators, and is arranged to transfer the call to the call centre on request from the customer. This allows the customer to speak to a human operator should they require information not provided by the automated response system.

25 Advantageously the processing means is arranged to further extract from the received data, a preferred time of call-back, and to initiate the call to the customer at that preferred time.

Another aspect of the present invention provides a method of operating 30 a telecommunications system comprising:

- receiving, at a server, data from a customer over a data network;
- extracting from the received data, a telephone number of the customer;
- initiating a telephone call to the customer over a telephone network, independent of the data network; and

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- using an automated response system to communicate with the customer by means of the telephone call.

Preferred features may be combined as appropriate, and may be
5 combined with any of the aspects of the invention as would be apparent to a person skilled in the art.

BRIEF DESCRIPTION OF THE DRAWINGS

10 For a better understanding of the invention, and to show by way of example how it may be carried into effect, embodiments will now be described with reference to the accompanying drawings, in which:

Figure 1 is a block diagram of a system which provides a call-back service;

15 Figure 2 shows the main functions of the system shown in figure 1;

Figure 3 shows the functional blocks of the call centre of figure 1;

20 Figure 4 is a flow chart showing operation of the call centre of figure 3;

Figure 5 illustrates one example of using an IVR system to deliver information to a customer;

Figure 6 illustrates another example of using an IVR system to deliver information to a customer;

25 Figure 7 illustrates one example of using an IVR system to receive information from a customer.

DESCRIPTION OF PREFERRED EMBODIMENTS

30 Figure 1 shows a telecommunications system which provides a call-back service to a customer. A customer equipped with a computer terminal 10 uses a data communications network, shown here as the Internet 15, to browse information pages stored on the Web servers of various companies. Terminal 10 contains "browser software" (for example, 35 NetscapeTM) which allows the customer to navigate among sites and to view pages provided by companies, in a manner which is well-known

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in the art. The first part of the connection between customer 10 and internet 15, may be provided by the PSTN.

5 A connection between a customer and one particular web server 20 is shown in figure 1. A company may have its own Web server or rent space on the web server of an internet service provider. For providing a call-back service, the company has a call centre 30 which comprises an automated response system, shown here as an Interactive Voice Response (IVR) system, a connection to the public telephone network 10 (PSTN) 25 via a PABX and an Internet Call Centre (ICC) which is essentially a middleware application that links these components together.

15 The ICC requires connection to a web server, either locally or via a Wide Area Network (WAN). Interfaces at the Web server 20 and ICC and a communications link allow information to be passed between these two blocks, as will be described later in more detail. A security firewall 22 usually exists between web server 20 and ICC to protect the company's computer system. This may involve the use of a proxy server. The ICC 20 and IVR system are coupled to one or more databases 35 which store call-back requests, customer details, information that the customer submits during a call-back session and information that the customer may request during a call-back session. The IVR system is connected to the public telephone network. It can be connected either directly to 25 the PSTN or preferably through a PABX such a Northern Telecom MERIDIAN™ PABX. Other PABXs can be used.

30 Figure 2 shows the main steps of the method by which a customer requests a call-back session. HTTP/HTML information pages are delivered to the customer's terminal in step 1. A customer browses 35 pages on the Internet and navigates to an interactive Web page, provided by the company, which acquires data from the customer. For example, a customer may navigate to a page where they can order a product, and are presented with a form to complete. One option on the page may be a link to the call-back page where customers who do not wish to pass their credit card details over the Internet can request a call-

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back. The call-back request page can request the customer to enter the telephone number on which they wish to receive a call-back. It can also include request the customer to enter a preferred time of call-back. Once the "SUBMIT", or similarly labelled, icon on the call-back page is 5 clicked, this information is carried back to the company's WWW server, as shown in step 2. The information is sent to a call-back processing function, shown as step 3, which initiates an outgoing call to the phone number provided. The system can provide near-instantaneous call back to a customer if that is requested or call-back at a later predefined time 10 specified by the customer on the web page.

As an alternative to the customer entering their telephone number, the call centre may inspect the data received from the customer, which includes a unique identifier of the customer, and use this identifier to 15 perform a search in a look-up table of identifiers and corresponding telephone numbers.

The call-back session between the customer's telephone 11 or fax machine 12 and the automated response system, shown as step 4, 20 takes place over a connection on the PSTN 25. The call-back session can be used in a variety of ways. Firstly, it provides a more secure way for a customer to pass sensitive information, such as credit card details, to the company whose web site they have just visited.

25 It is also possible to use this session to deliver information more securely from the company to the customer. An example of this is where a customer visits the Web site of a bank to check share values, currency exchange rates or similar information. The customer then decides to check his balance or request details of recent transactions. 30 Not wanting to receive this information via the data network, he requests a call-back for this information. The required information can be requested on the form which is submitted to the Web server, in which case the information can be presented immediately to the customer at the beginning of the call-back session. It is also possible to use the 35 actual page to which the customer responds to identify the required information. For example, a bank can provide pages for each commonly

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required piece of information, such as "Balance" and "Statement". A customer requesting a particular page, and submitting their call-back details on that page, instructs the automated response system to retrieve that piece of information for the customer and to deliver it during

5 the call-back session.

Alternatively, the required information can be requested and delivered during the call-back session as a result of the customer following menu prompts.

10

The information can be delivered by voice or by a facsimile transmission.

Once the IVR application is started, the customer is called and

15 presented with a menu of options. The precise nature of these options is chosen by the operator and depends on the application. Typically the first menu of options would include some query and response system involving a combination of DTMF tones, text-to-speech conversion i.e. speech generation and speech recognition. With automated speech

20 recognition, a customer uses spoken responses rather than manual input on a telephone keypad. Typically this function supports speaker-independent recognition of digits 0-9 and common words such as "yes", "no" in one or more languages.

25 As far as the customer is concerned however, this is an unseen system working behind the Internet, that automatically calls them up on the telephone once they have entered in their details. This provides the Call Centre with an opportunity to filter only those potential customers whom it wants to target.

30

The system provides a working base for other developers/distributors to work with. By this it will be a working system, with a shared data structure. This is necessary because it is possible that a company will already have their own Web Server or be using one from an Internet

35 Service Provider.

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All equipment operates on the TCP/IP protocol on an Ethernet network with all PCs running Microsoft WINDOWS NT™ and WINDOWS 3.1™ operating systems having the necessary TCP/IP stack. Computers having other operating systems can be used.

5

The components and operation of the ICC will now be described in more detail, with reference to figures 3 and 4.

10 Common Gateway Interfacing (CGI) is used between the Web server and the ICC. A CGI data extractor 40 takes the data string returned from the customer and the HTML source page and extracts the separate data fields. Using the HTML source page, identification of the individual fields is straight forward with all the data being forwarded to the next block. The identity of the HTML page that the customer returned their 15 information on may also be stored, where the page itself represents a request for a particular piece of information.

20 The data forwarded to the Call Centre from an Internet user is very much tied into what the customer's environment already is. Primarily the information level is quite low, but containing a high level entropy. This is due to the fact that the Internet user would have already selected the type of product by virtue of accessing the relevant Web page, and filled out the small form which contains the user's telephone number.

25 A database update block 42 provides a direct update of database 35. The database update can use Structured Query Language (SQL) or a similar method. This block then passes the phone number and any time event information provided by the customer to a scheduler block 45.

30 The scheduler block 45 operates with both the out-dialler 47 and the database 35 to correctly and accurately dial the customer. The scheduler can schedule calls according to the time requested by the customer, available resources (i.e. number of free IVR ports), priority of the customer requesting the call-back, or some other criteria.

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The out dialler is in reality an interface block, interfacing to the IVR system. It provides feedback to the scheduler 45 on the progress of the call. IVR systems often include their own outdialling function; in this case outdialler 47 exists as part of the IVR system 50.

5

A flow diagram of the steps for a call-back operation are shown in figure 4. The main events or stimuli when the system is in operation is the user clicking the 'Submit Order' icon on the Web page and sending his call-back details to the web server, at step 60. This starts either an executable or a script in the Web Server. Once the Web Server forwards the information, at step 62, to the ICC system, the data extraction of the CGI stream is carried out at step 64. The data is then split into two parts, the first being the phone number and any data relating to the required time of call back. The second section of data is that entered by the Internet user, and is used to update an SQL database. This additional information could identify the particular item of information that the customer is interested in.

20 The required phone number is then passed to a scheduler which schedules a call-back at step 68. This operates with the out dialler application to resolve the number of lines free/agents available. It then makes an out bound call via the outdialler, at step 70. If the out-dialler is unavailable then notification is passed back to the scheduler and a reschedule takes place.

25

Once the out dialler receives a parameter, usually a phone number, it commences initiation of an out bound call. This would be either TSAPI, TAPI, TAPIS or IVR compliant. The outdialler retains control of the call until such time as the called person is connected to an IVR session.

30

Following out-dialling the application awaits, at step 72, responses from the called party. Possible responses are now described.

Voice Response

35 This is the most common type of response. Detecting a voice response invokes the normal IVR routines of data collection, data retrieval and/or

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data verification. If speech recognition is being used, it is possible to compare the customer's spoken responses to a stored record of the customer's speech. A mismatch between the detected speech and the stored speech can be used to end the call before any confidential 5 information from database 35 has been delivered to the customer by the IVR system.

Answer Machine Response

Upon detecting a response by an answering machine the IVR system 10 can leave a speech message verifying that call-back actually took place. This message could also include information on when follow-up calls will occur. This should be carried out in most situations. The system can reschedule further call-backs based upon a set of rules of the kind used by predictive out-diallers. These rules determine the best capture time 15 for the recipient. Alternatively, if a customer has requested a call-back to receive a particular piece of information, then the requested information can be left as a message on the answer machine by the IVR system retrieving the information from database 35 and formatting it in the form of a spoken message for sending to the answer machine.

20

Modem response

Upon detecting a response by a modem the system delivers the following data in a format which is compatible with the customer's 25 modem.

25

Fax Machine Response

Upon detecting a response by a fax machine the IVR system formats data in a manner which is suitable for delivery to the customer. If a customer has requested a call-back to receive a particular piece of 30 information then the requested information can be delivered during the fax response using a suitable template report. Alternatively, if the IVR detects a fax machine response and has no information to deliver, the IVR system can send a fax message confirming that a call-back attempt was made and giving details of future call-back attempts, similarly to the 35 answer machine case described above.

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ADSI Phone Response

ADSI or Analogue Display Services Interface phones can be addressed in a normal terminal method. Hence once a person with such a phone requests call back the amount and quality of information can be 5 customised and increased to suit the user. Thus the terminal could be used as the continuation of Web services where future terminals using Java™ technologies could be deployed.

10 The IVR system can preferably modify its response according to the response detected at step 72. For example, where a user has requested a call-back to receive his bank balance, the IVR system can deliver this information as a speech message to a customer's telephone or a text message in fax format to a customer's fax machine according to whether a voice or fax response is detected at step 72. This 15 minimises the need for rescheduling at the call centre and ensures that the customer receives their information with minimal delay.

20 If no response is detected at step 72, or if the detected response is unsatisfactory (e.g. an answer machine) then out-dialling is rescheduled at step 74. This rescheduling can be based upon the rules already used in the predictive diallers of call centres. Control of the rescheduling can be carried out within the IVR system itself or at the system database, dependent upon local deployment configurations.

25 Figures 5 to 7 give some examples of typical IVR scripts. During the IVR session data is entered and retrieved from database 35. The IVR scripts, themselves can also be stored on database 35 or on a database which is part of the IVR system. The choice of IVR script is dependent upon the data submitted by the customer over the Internet, and the 30 particular HTML page to which the customer responded. For example, where a customer has requested their current account balance (the example shown in figure 5) the IVR script plays appropriate prompts to the customer and retrieves the appropriate information without further interrogating the customer, thereby minimising the length of the call-back session.

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- In the example script shown in figure 5 it is assumed that a customer has already requested a call-back, giving his call-back details and asking for his current account balance. The IVR script begins with dialling out to the customer (step 80) and waiting for a response (step 82). Upon detecting a voice response a greeting prompt is played to the customer (step 84). The current account balance is then retrieved from a customer database (step 86). A further prompt is then played to the customer "Your current account balance is.." (step 88) followed by the amount, which is converted from a data format to speech by the IVR system. A further prompt is played instructing the customer of the possible options at this point, such as paying a bill, listing recent transactions etc. (step 92). The IVR system awaits the customer's response at step 94.
- 15 One option which can be offered to the customer is that of speaking to a live operator. Upon selection of this option, the call is classed as 'Zero Out'.
- Once the customer selects the 'Zero Out' option the call can be dealt with in a number of ways. A first option is to present the call to a waiting agent. This involves using an internal database to select the next free agent. The second option is to present the call to a CDN and allowing the Nortel MERIDIAN™ Automatic Call Distribution (ACD) queue to process the call upon its rules. This utilises features such as Skill Based Routing and multiple queue assignment. Other ACDs can be used.
- 20
- 25
- Once the call progresses to a logged-on and available agent, such as one of agents 36, 37 in figure 1, the following events occur:
- 30
1. The calling line identification (CLID) of the customer is presented to the agent's computer;
 2. The agent's screen initiates a database search;
- 35
3. The result of the database search is presented to the agent as a screen pop;

- 14 -

4. The agent is then connected to the customer.
5. Linking of the Call Centre screen pop-up preferably uses the SQL database in conjunction with TSAPI. Indexing or data searching uses a unique key based upon data such as a customer's phone number. The agent receives a record of the information that the customer has already entered into the IVR system as a screen pop. This allows the agent to 10 avoid asking redundant questions and to concentrate on the customer's query.

A second example of an IVR script is shown in figure 6. Here it is assumed that a customer, such as a maintenance engineer, has already 15 requested a call-back to a particular telephone number asking for a plan of a particular machine that he is working on. The IVR script begins with dialling out to the customer (step 100) and waiting for a response (step 102). Upon detecting a fax machine response the IVR system proceeds to retrieve the information that has previously been requested from a 20 database (step 104). The retrieved data is converted into a form suitable for fax transmission (step 106) and faxed out (step 108).

A third example of an IVR script is shown in figure 7. Here it is assumed that a customer has already requested a call-back at a particular 25 telephone in order to securely submit their credit card details. As before, the IVR script begins with dialling out to the customer (step 110) and waiting for a response (step 112). Upon detecting a voice response a greeting is played to the customer followed by a prompt to enter credit card details (step 116). The IVR system detects the customer's 30 response (step 118) by detecting DTMF tones or by detecting the customer's speech. The data submitted by the customer is then entered in database 35 in an appropriate record (step 120) before a closing message is played to the customer.

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There are a number of interfaces within the system. These are detailed in order of data flow:

Customer to Web Server

- 5 This takes the form of a HTTP page, and sends data entered by the Internet User to the Web Server using the Common Gateway Interface (CGI).

ICC to IVR

- 10 This interface is the most critical, since it is this interface that takes the phone number for out dialling to the Internet user. This takes the form of a remote procedure call, RPC, which is operating system independent, relying only on TCP/IP sockets for data transaction. Employing this technology enables scalability because the network objects built with 15 these RPCs can reside on the same server or on multiple servers.

ICC to Call Centre Database

- This is carried out using SQL updates to the central database used by the Call Centre presently. Again this is dependant on the Call Centre 20 environment, and the type of database used.

ICC to Call Centre Agent

- This is more of a telecoms interface and could be regarded as the second half of a CTI, with the Web Server to Call Centre database being 25 the first. Essentially the IVR generates a call transfer using the XFER cell, placing the outgoing call to the customer and the agent. The other option is to use a TSAPI or TAPI server to forward the call to an ACD queue via MERIDIAN™ LINK.

- 30 To enable the system to be easily adapted to different applications, customisable modules can be provided. Firstly, the interface between the customer data terminal and the server can be made up of customisable cells. Secondly, the interface between the customer 35 telephone terminal and the automated response system can also be made easily adaptable by means of customisable modules.

CLAIMS

1. A telecommunications system comprising:
 - a server arranged to issue information to a customer and to receive data from the customer over a data network;
 - a processing means, coupled to the server, which is arranged to extract, from the received data, a telephone number of the customer;
 - initiation means to initiate a telephone call to that customer via a telephone network independently of the data network; and
 - an automated response system which is arranged to communicate with the customer by means of the telephone call.
2. A telecommunications system according to claim 1 wherein the received data includes an identifier of the customer and the processing means is arranged to retrieve a stored telephone number of the customer using the customer identifier.
3. A telecommunications system according to any preceding claim wherein the automated response system is arranged to receive further data from the customer by means of the telephone call.
4. A telecommunications system according to any preceding claim wherein the automated response system is arranged to deliver further data to the customer by means of the telephone call.
5. A telecommunications system according to claim 4 wherein the processing means is arranged to extract, from the received data, an information request, and the automated response system is arranged to retrieve the requested information and to deliver it to the customer by means of the telephone call.
6. A telecommunications system according to claim 4 or claim 5 wherein the server is arranged to issue a plurality of information pages to a customer and the automated response system is arranged to retrieve information dependent upon the page to which a customer

responds and to deliver the retrieved information to the customer by means of the telephone call.

7. A telecommunications system according to any one of claims 4
5 to 6 wherein the automated response system delivers the further data by facsimile.

8. A telecommunications system according to any preceding claim wherein the initiation means initiates a telephone call and monitors
10 response to the call and wherein the automated response system communicates with the customer in a manner which is compatible with the monitored response.

9. A telecommunications system according to any preceding claim
15 further comprising means for determining, from stored customer information and from the data received from the customer, whether to permit the initiation means to initiate a call to the customer.

10. A telecommunications system according to any preceding claim
20 further comprising means for determining, from stored customer information and from responses made by the customer during the telephone call, whether to continue the telephone call to the customer.

11. A telecommunications system according to claim 10 wherein the
25 automated response system performs speech recognition and compares speech received from the customer with a stored record of the customer's speech.

12. A telecommunications system according to any preceding claim
30 wherein the automated response system is coupled to a call centre manned by human operators, and is arranged to transfer the call to the call centre on request from the customer.

13. A telecommunications system according to any preceding claim
35 wherein the processing means is arranged to further extract from the

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received data, a preferred time of call-back, and to initiate the call to the customer at that preferred time.

14. A telecommunications system according to any preceding claim 5 wherein the automated response system responds to tones submitted by a customer.

15. A telecommunications system according to any preceding claim 10 wherein the automated response system is an Interactive Voice Response (IVR) system.

16. A telecommunications system according to claim 1 wherein the server comprises an interface to the customer which is made up of customisable cells.

15

17. A telecommunications system according to claim 1 wherein the automated response system comprises an interface which is made up of customisable modules.

20 18. A method of operating a telecommunications system comprising:

• receiving, at a server, data from a customer over a data network;

25 • extracting from the received data, a telephone number of the customer;

• initiating a telephone call to the customer over a telephone network, independent of the data network; and

• using an automated response system to communicate with the customer by means of the telephone call.

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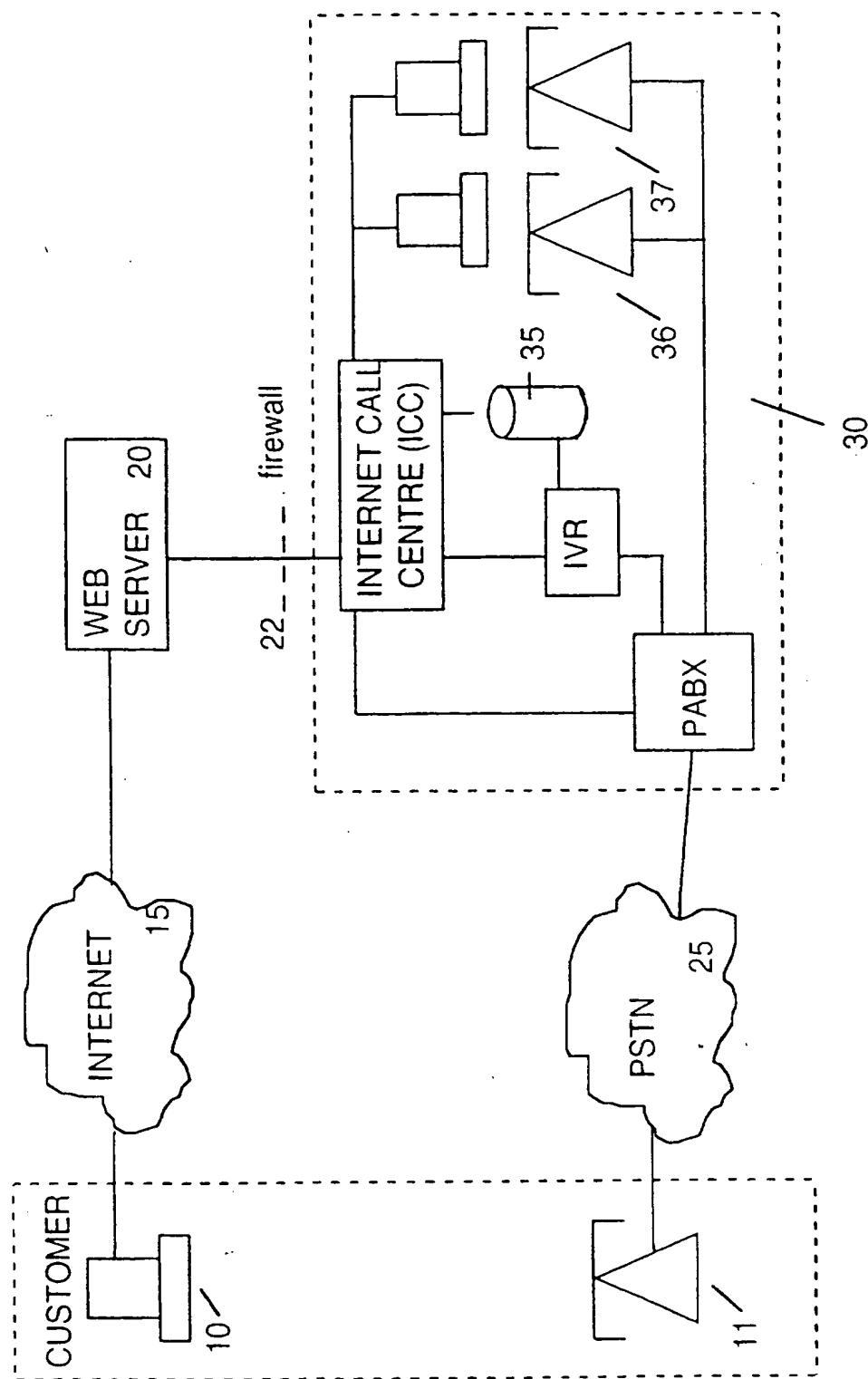


FIG 1

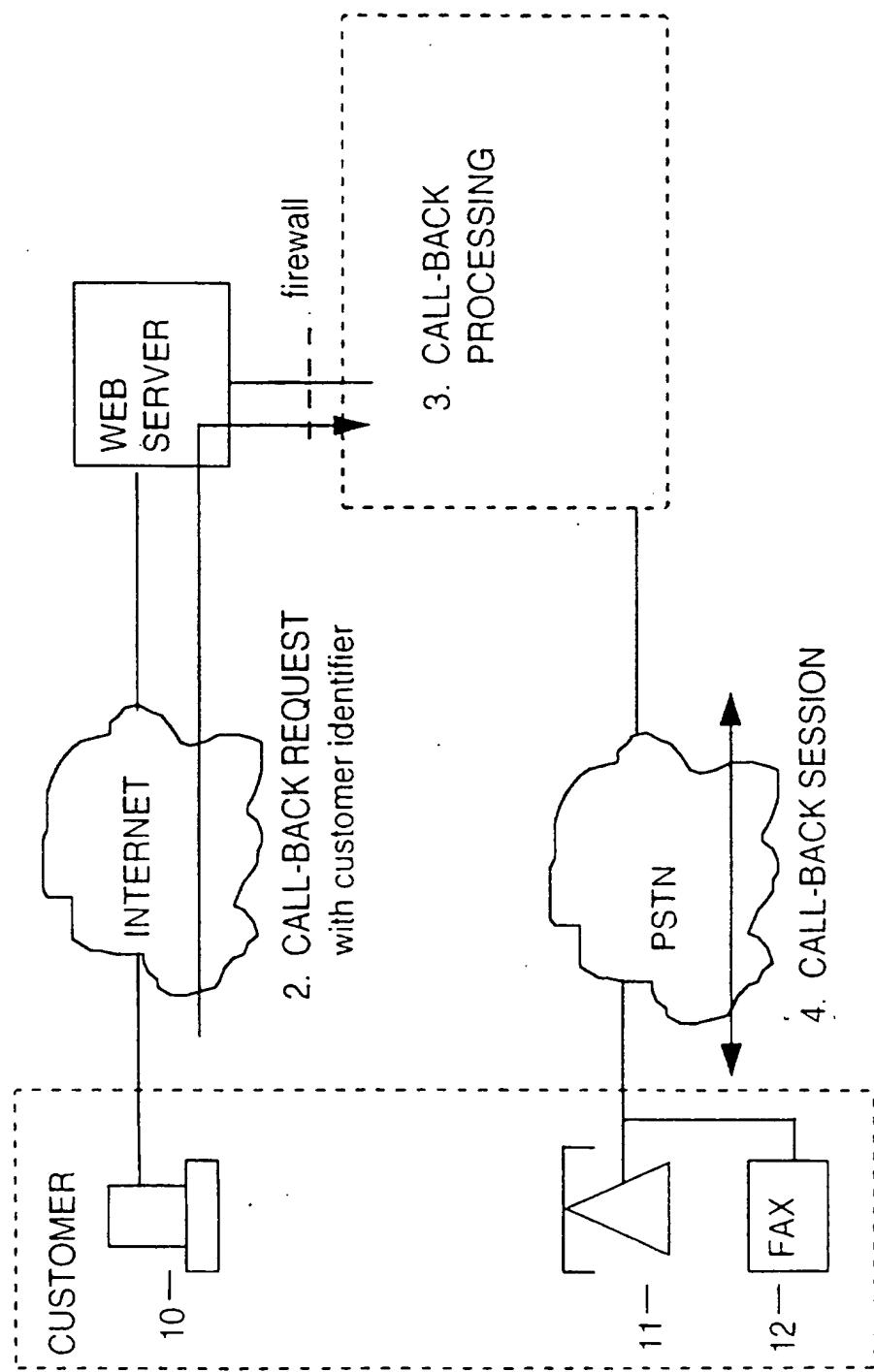


FIG 2

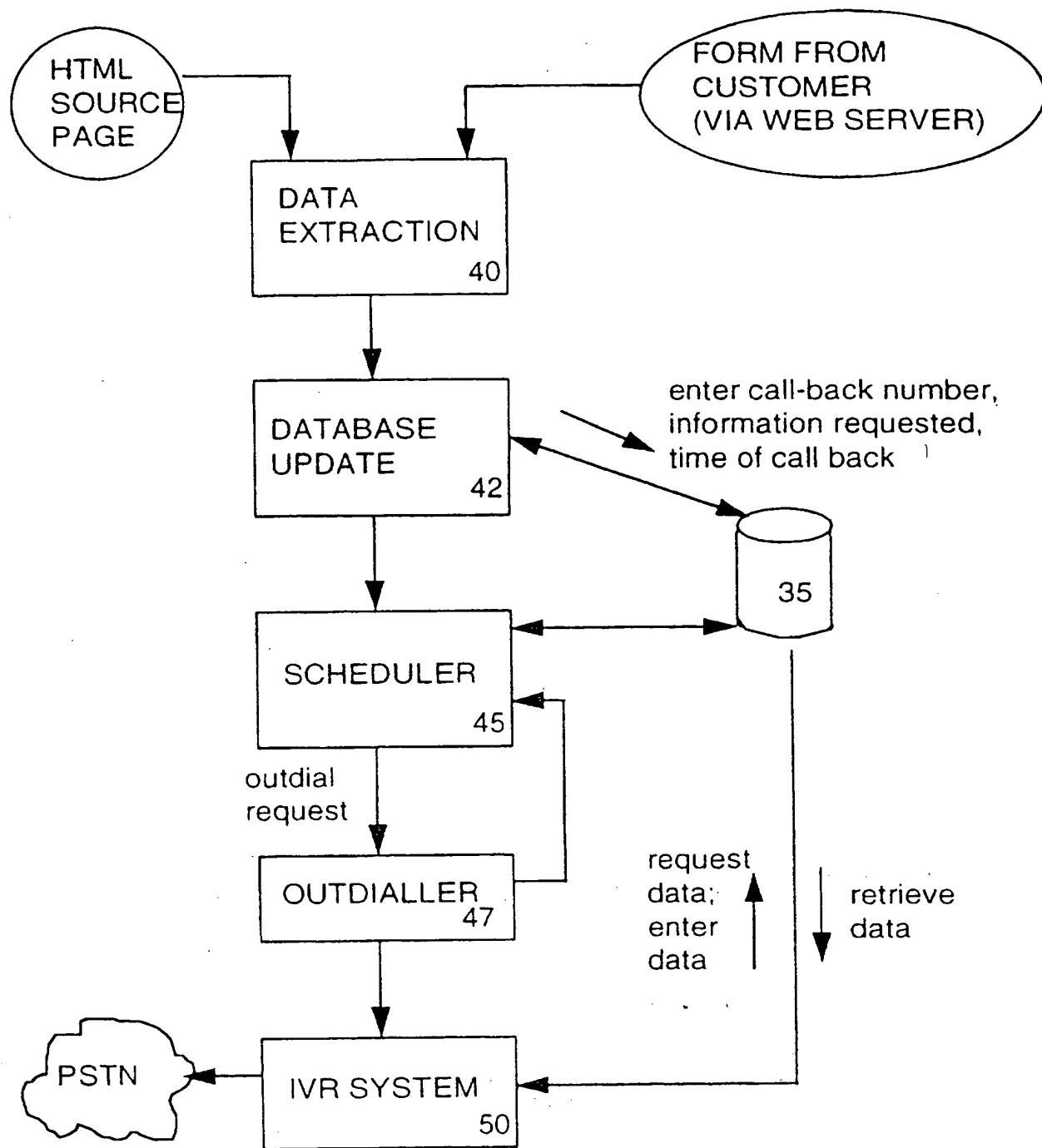


FIG 3

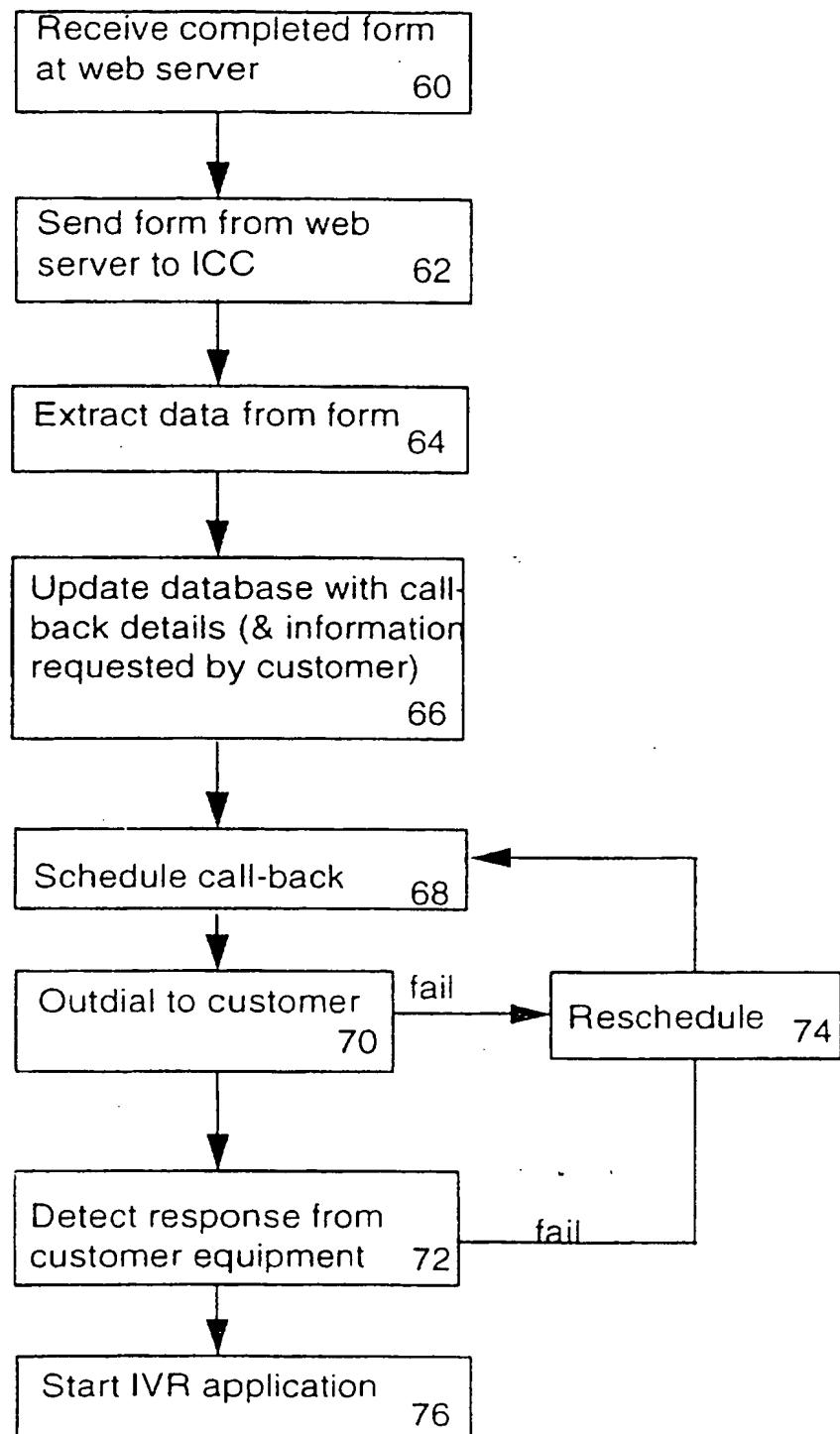


FIG 4

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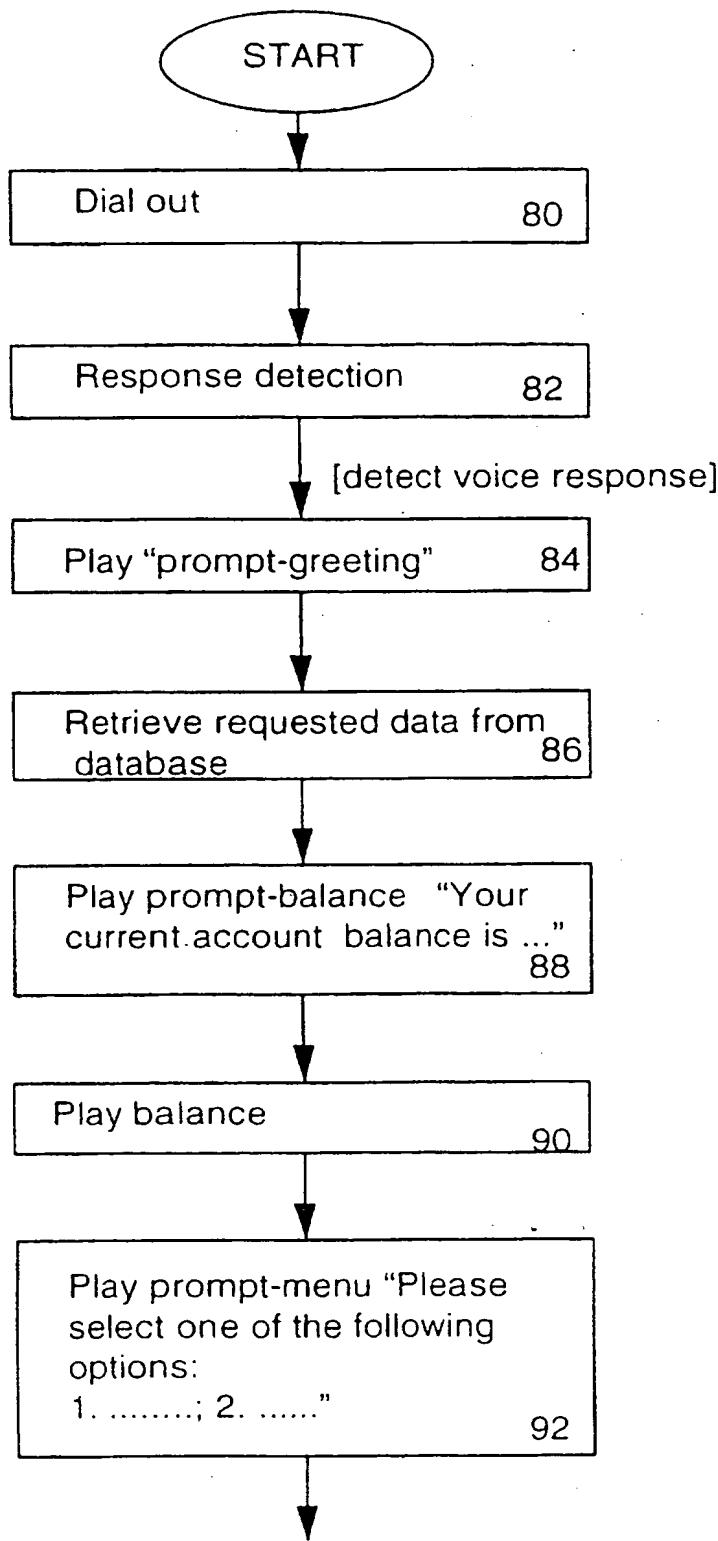


FIG 5

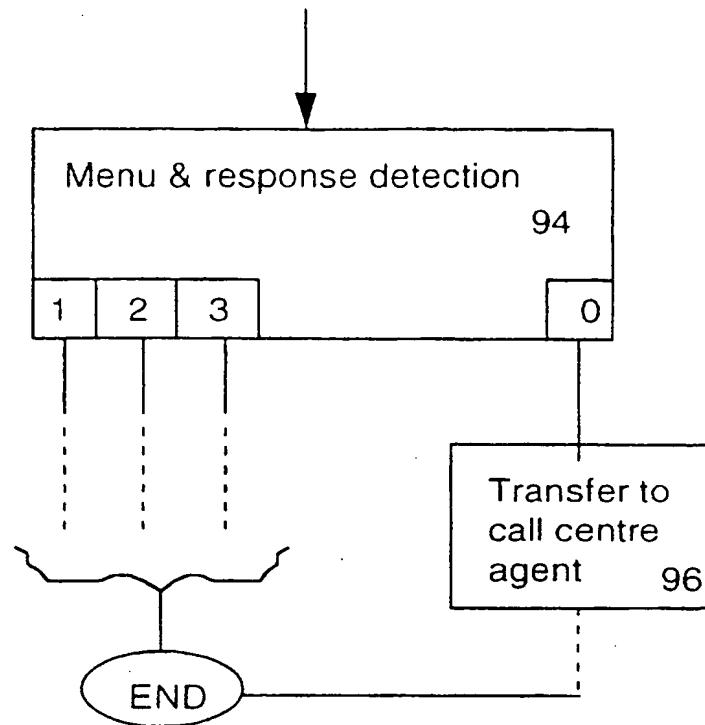


FIG 5 contd

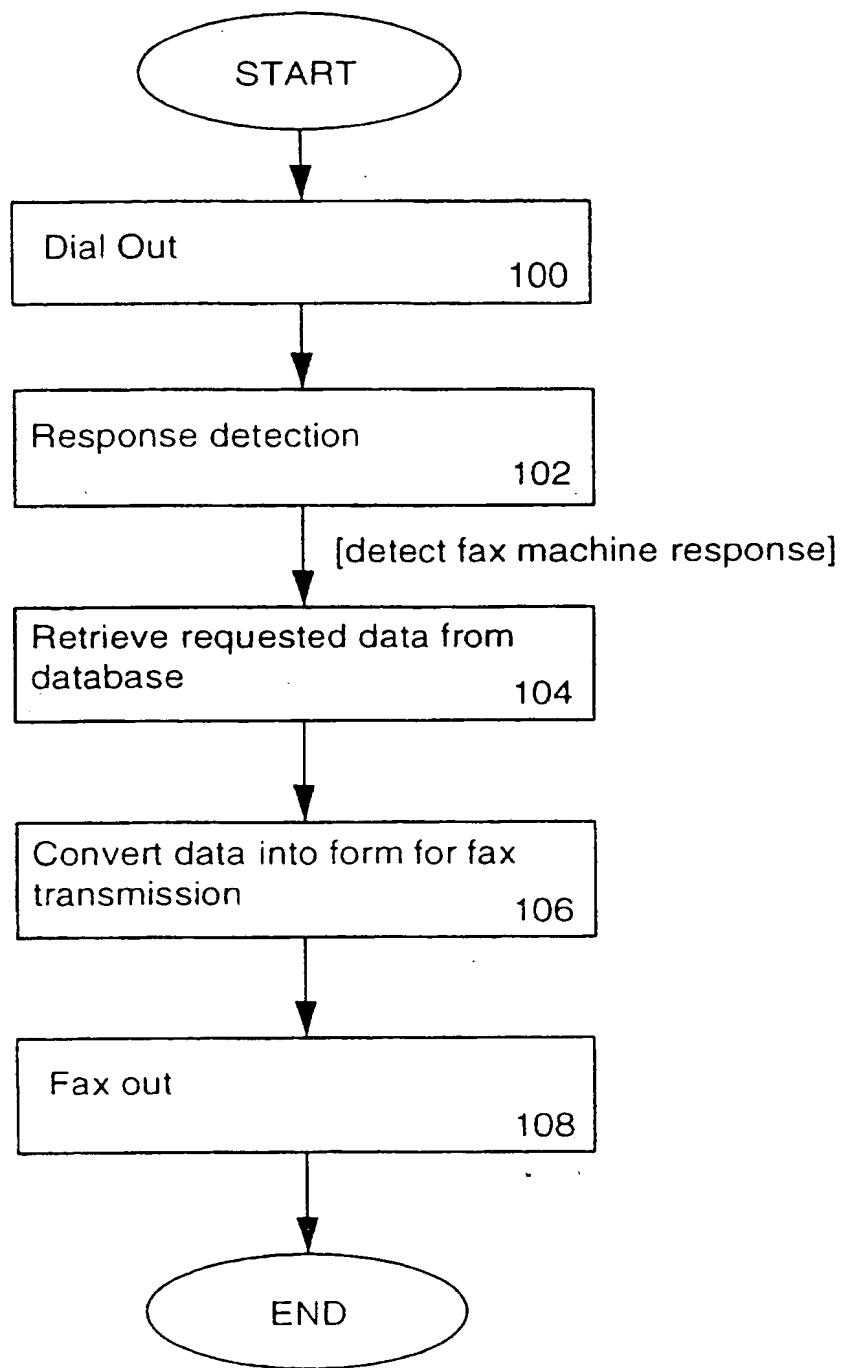


FIG 6

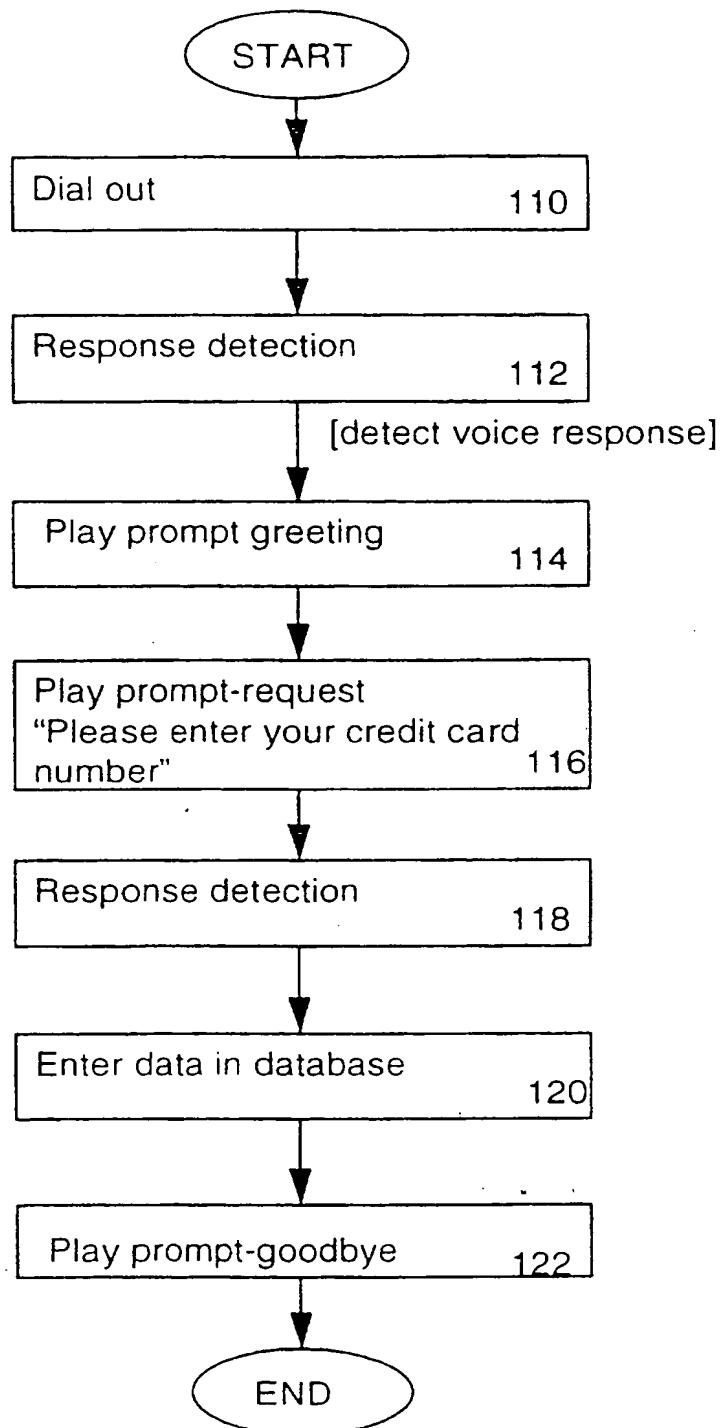


FIG 7

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 97/00778

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04M3/50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category ²	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	"WORKSTATION COMMUNICATIONS SYSTEM" IBM TECHNICAL DISCLOSURE BULLETIN, vol. 37, no. 9, 1 September 1994, pages 101-104, XP000473347 see the whole document	1,3,4,6, 7,15,18
A	---	2,5, 8-12,14, 16,17
Y	---	13
X	WO 93 22866 A (PARAGON SERVICES INTERNATIONAL) 11 November 1993	1-4,9, 10,14, 15,18
Y	see abstract	11
A	see figures 1-4	5-8,12, 13,16,17
	see page 4, line 25 - page 10, last line	
	see page 19, line 8-25	
	see claims 1-5	

	-/-	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

³ Special categories of cited documents

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& document member of the same patent family

1 -

Date of the actual completion of the international search

27 October 1997

Date of mailing of the international search report

06.11.97

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Authorized officer

Cichra, M

INTERNATIONAL SEARCH REPORT

Internat'l Application No

PCT/IB 97/00778

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
P,X	EP 0 740 445 A (ROCKWELL INTERNATIONAL CORP) 30 October 1996	1,3-6,
A	see abstract; figures 1-3	12,13,18
	see column 2, line 23 - column 3, line 29	2,7-11,
	see claims 1-7	14-17
Y	---	
A	EP 0 401 804 A (SHARP KK) 12 December 1990	13
	see abstract; figures 3,4	1,6,7,18
	see column 2, line 23-51; claims 1-6	
Y	---	
A	EP 0 311 414 A (NIPPON ELECTRIC CO) 12 April 1989	11
	see the whole document	1,2,9, 10,18

1		

INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat

ional Application No

PCT/IB 97/007.78

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